NASA Global Hawk Project Overview

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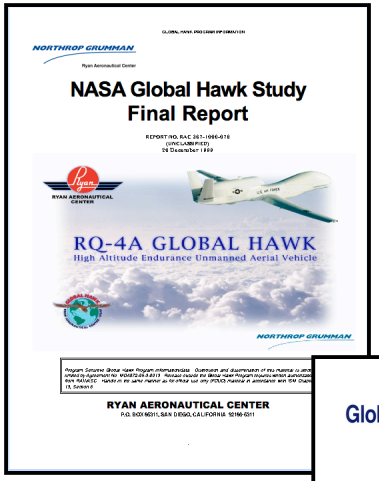
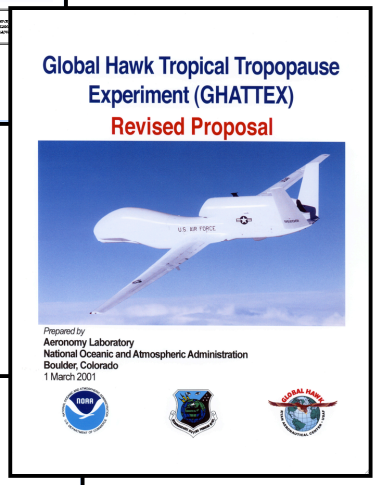
Global Hawk Planning Activities Through the Years

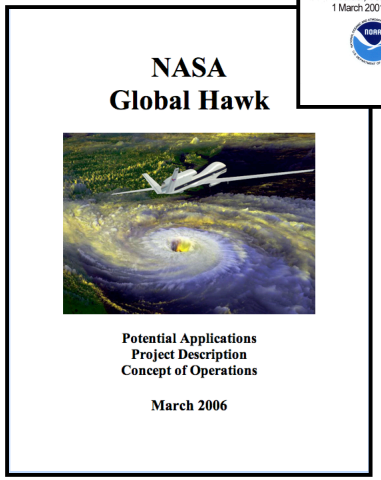
- **1999 NASA-Funded Global Hawk Study.**
  - – The goal of this study was to understand the feasibility and cost of integrating NASA Science Payloads on a Global Hawk aircraft.
  - – The primary assumption was to fly NASA payloads on USAF aircraft on an as-available basis.
  - – Due to other DoD priorities, no USAF Global Hawk aircraft were available for civil missions.

- **2001 GHATTEX Mission Feasibility Study.**
  - – This proposal was developed by NOAA/NGSC in response to a NASA Science Mission Directorate request for proposals.
  - – The proposed mission was shown to be feasible, but was not pursued due to continued lack of USAF aircraft availability for civil use.

- **2005-2006 Mission Concept Study**
  - – This joint NASA/NGSC study was conducted with the expectation that the Global Hawk Advanced Concept Technology Demonstration Phase was nearing completion. (final ACTD flight was in Aug 06)
  - – This study convinced the 303d that the 2 available ACTD aircraft should be transferred to NASA Dryden.



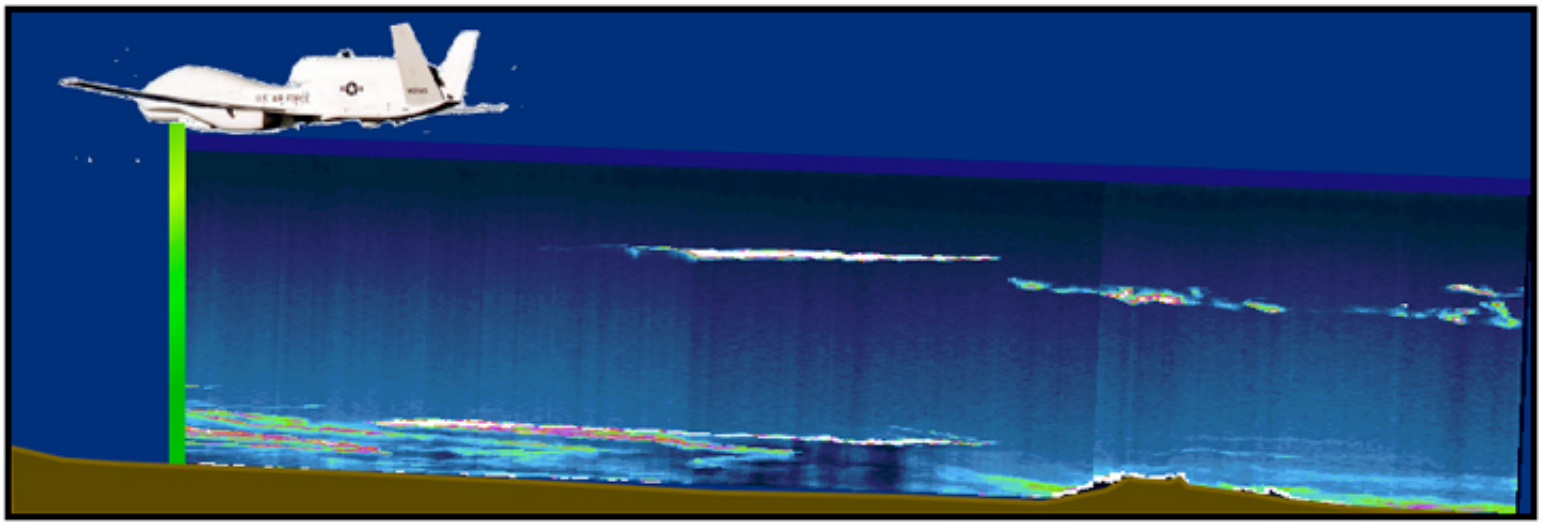




Why is NASA Standing Up the Global Hawk Capability?

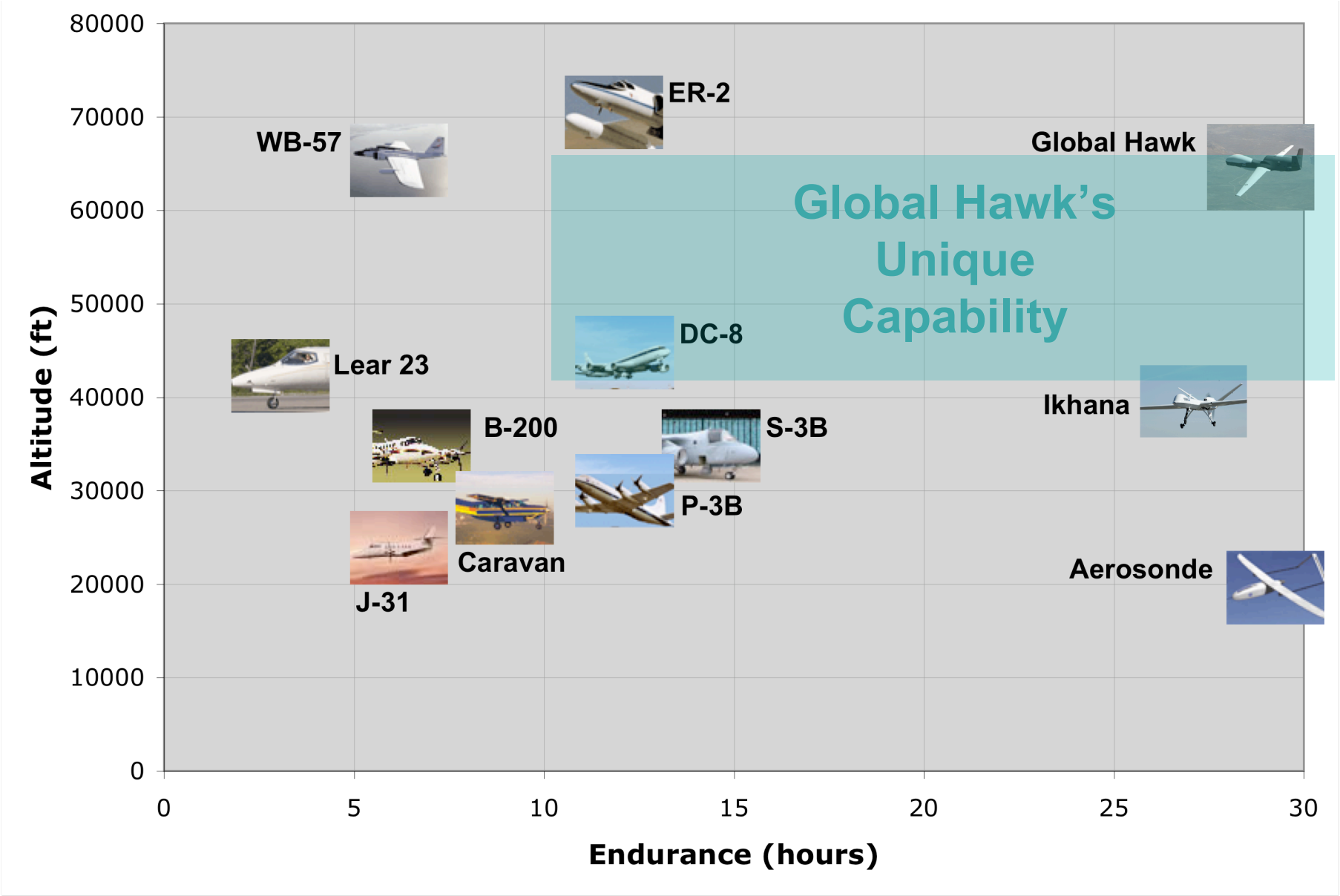
- **Global Hawk is the only available system capable of simultaneously meeting the requirements for high altitude (65K ft), long endurance (>31 hours), power (10 KVA), and a large payload capacity (2000 lbs).**

- **There are important NASA and NOAA science data gathering and satellite validation requirements that can only be met with the combination of capabilities provided by the Global Hawk system.**



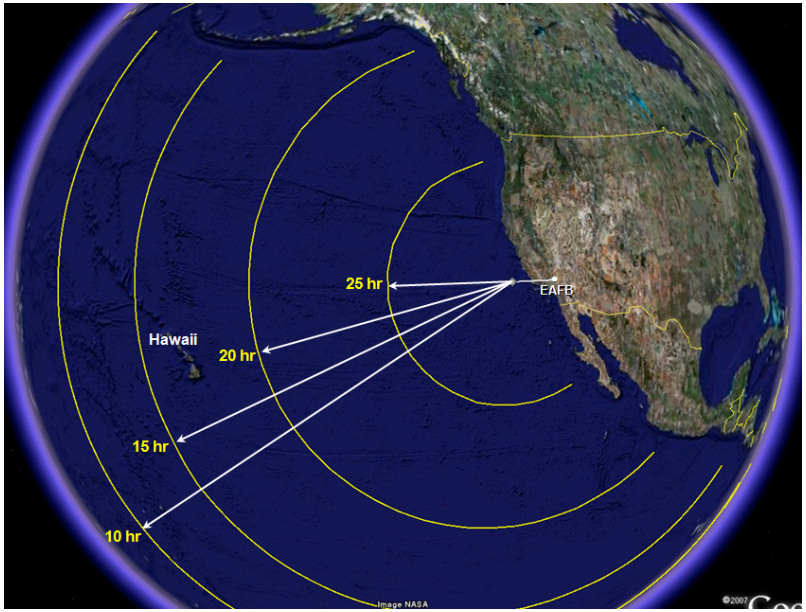
A Global Hawk aircraft, with a Cloud Physics Lidar, collecting atmospheric data.

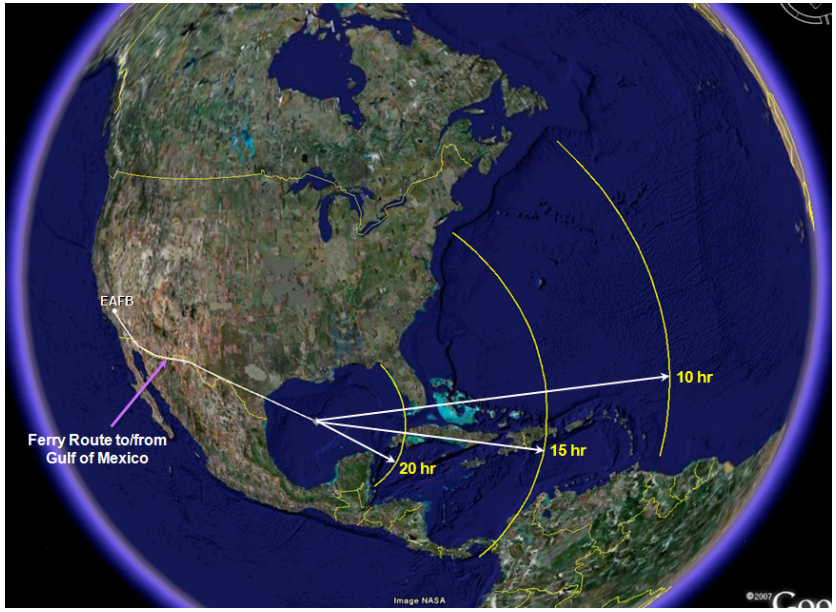
Aircraft Available for NASA Airborne Science

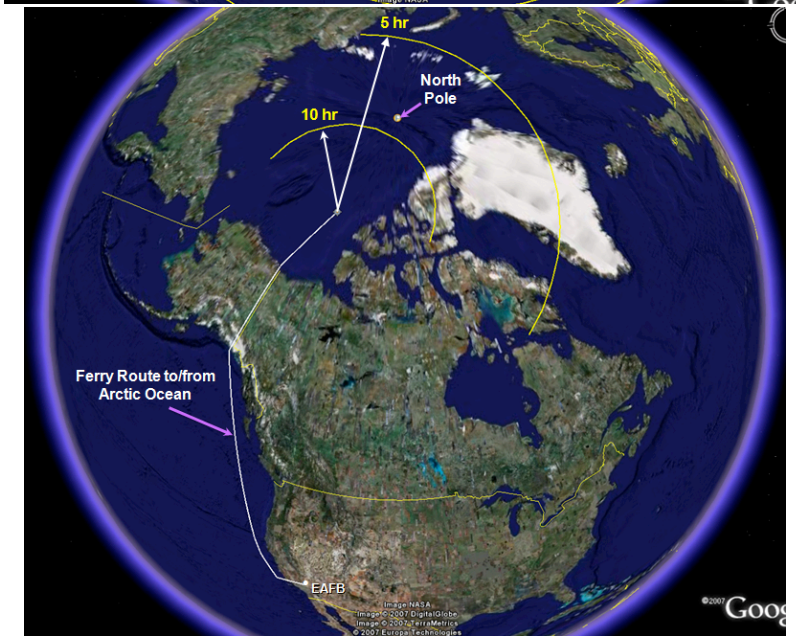


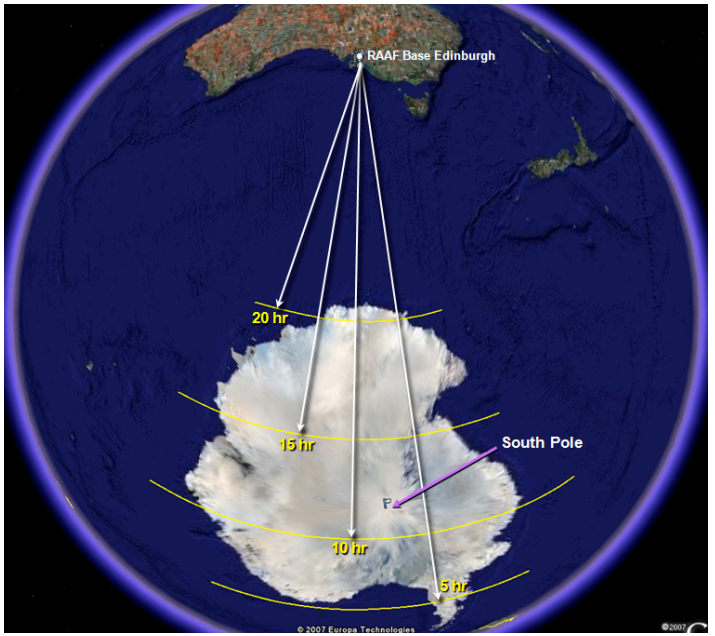
Global Hawk Operational Capability

Four Mission Regions, with Arcs of Constant On-Station Times





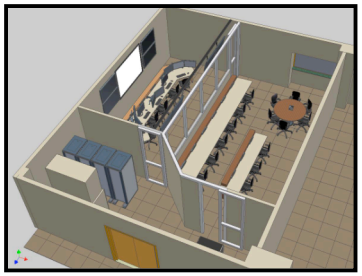


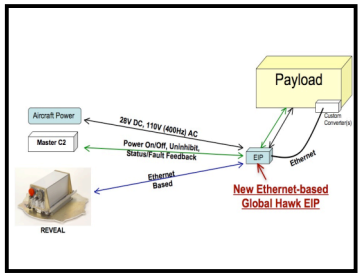


Baseline Capability at Stand-up Completion

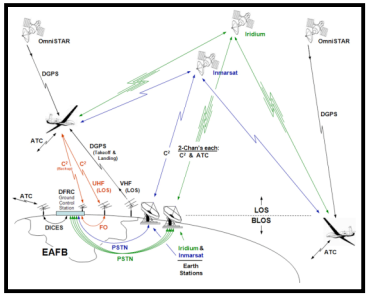
- Aircraft
  - 2 operational aircraft.
  - Power and ethernet provided in each payload bay.
  - REVEAL system for payload C2 and status.

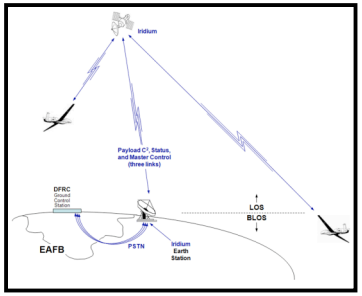
- Ground Control Station.
  - Building based ground station at Dryden.
  - Flight operations area with 5 work stations.
  - Large payload operations area.





- Aircraft Command and Control (C2) communications.
  - LOS -- 2 UHF/LOS links.
  - BLOS -- 2 Iridium links and 1 Inmarsat link.

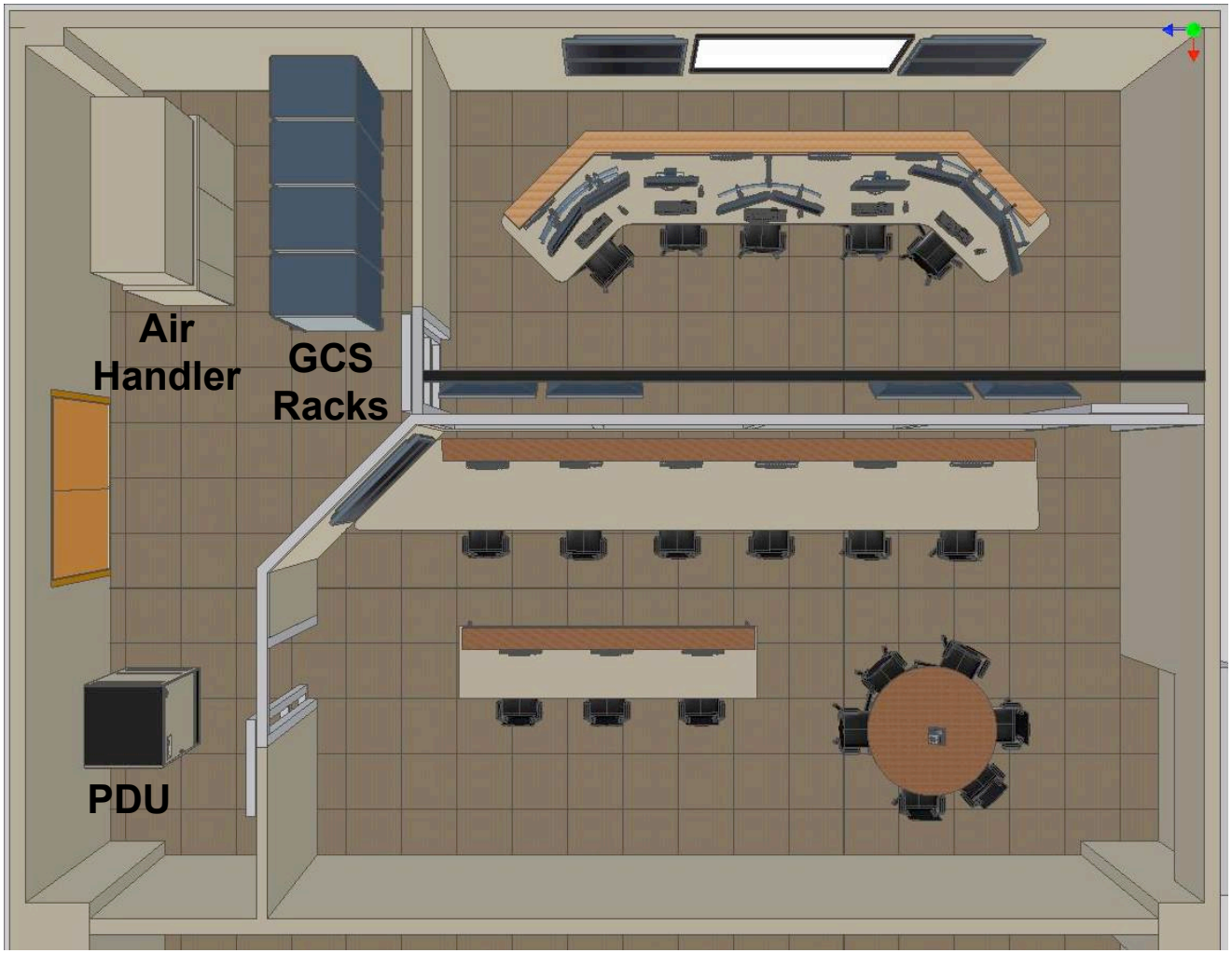




- Air Traffic Control communications.
  - LOS -- VHF/UHF radios at Dryden.
  - BLOS -- 2 Iridium links with aircraft.

- Payload C2 and Status communications.
  - 5+ Iridium links.

Ground Control Station Layout



Flight Operations

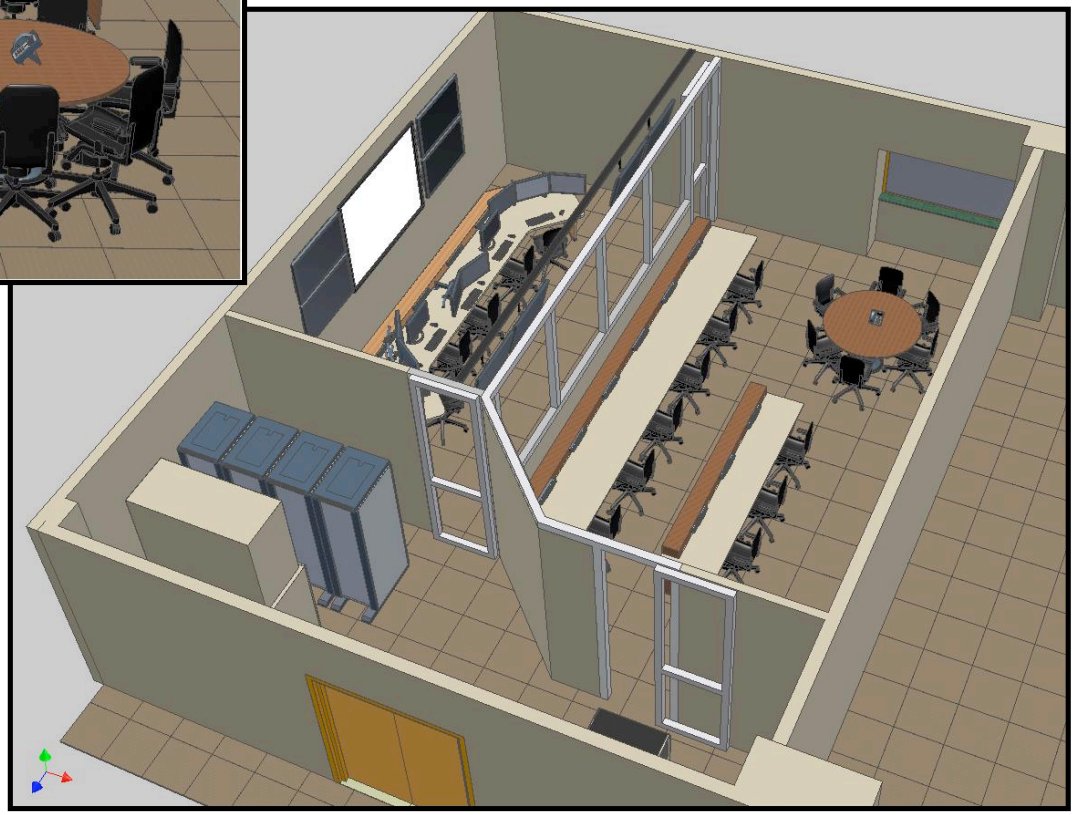
- Primary Pilot
- Second Pilot (Instructor or next shift)
- Flight Operations Manager
- Payload Manager
- GCS Systems Manager

Payload Operations

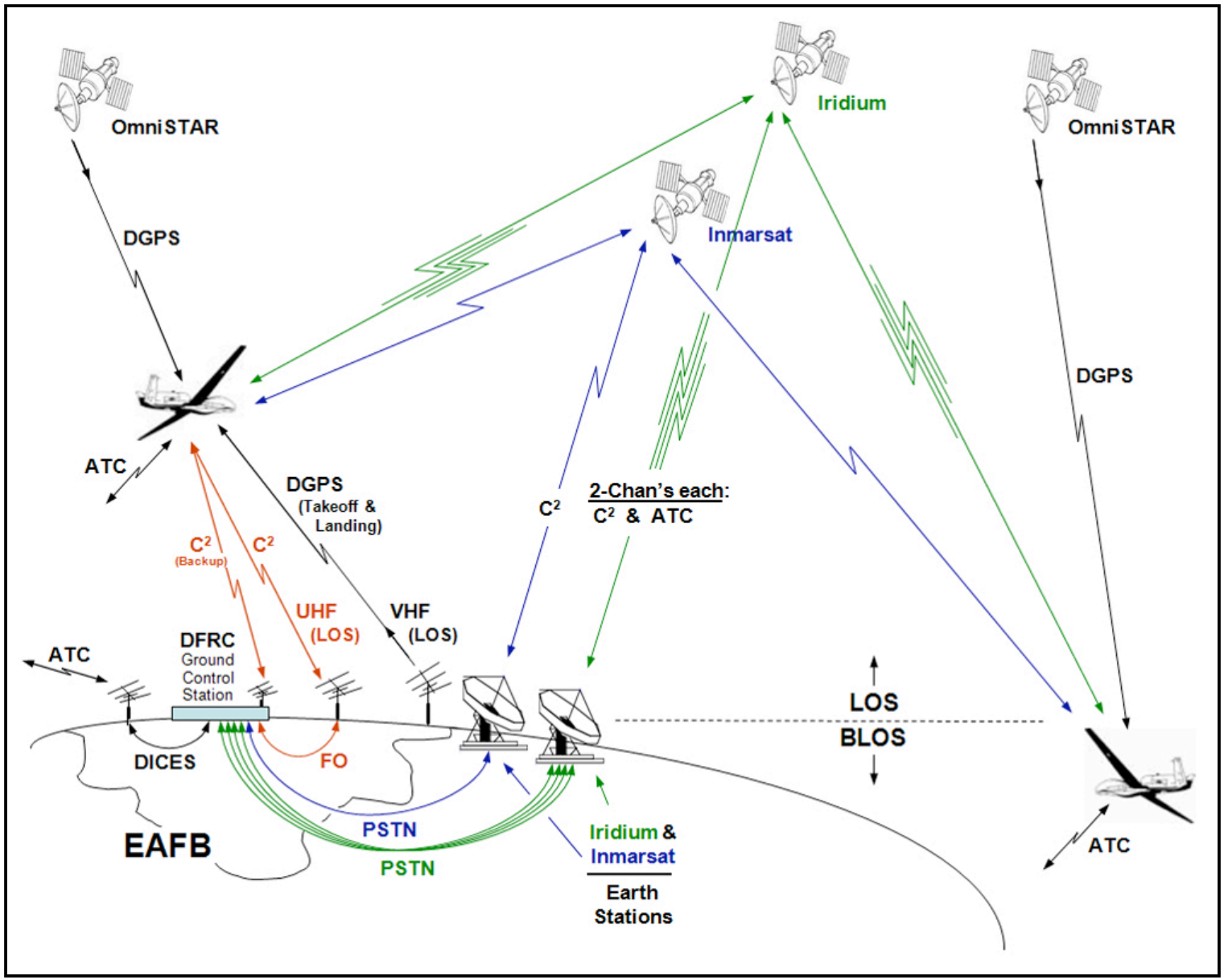
- Multiple work stations, meeting space, and additional amenities.
- Interactions among payload operators will not distract Flight Operations activities.
- All requests for real-time mission alterations will flow through the Payload Manager.
- Work stations are configurable for additional Flight Operations support, such as, RSO or Weather.

The design has evolved with inputs from the USAF and Navy Global Hawk operators, the NASA Ikhana operators, NGSC, and Scientists.

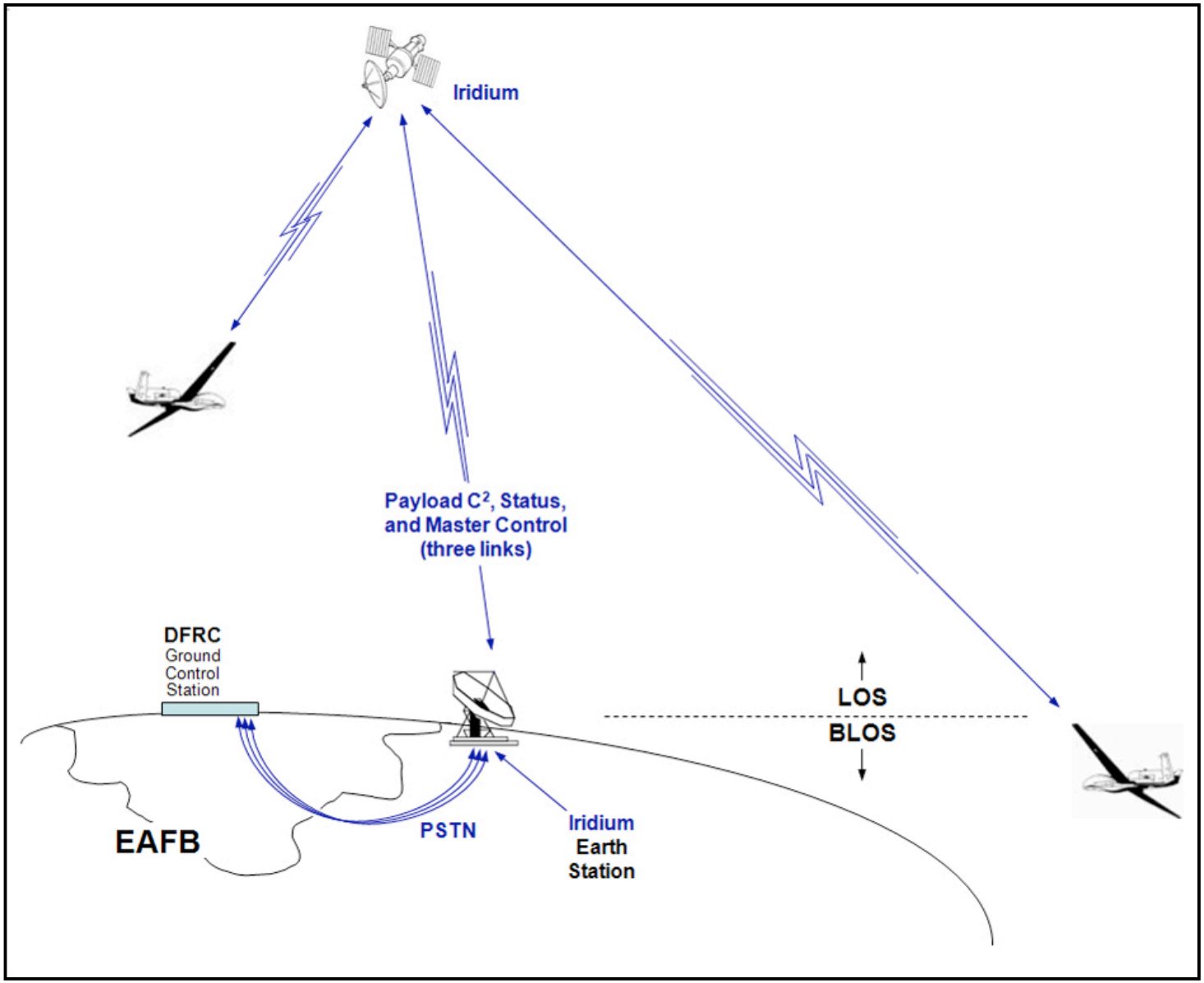
Additional GCS Views



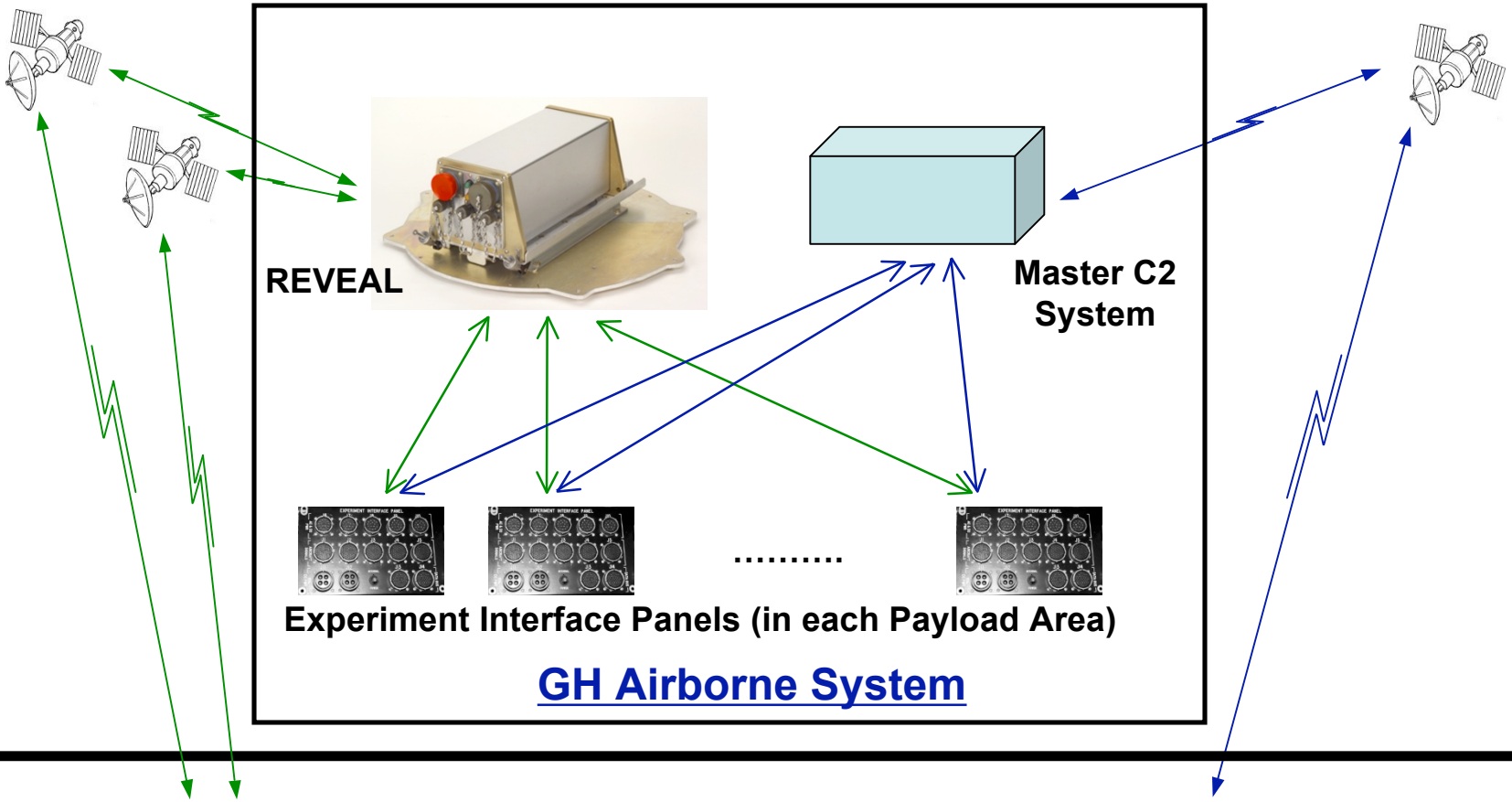
Flight Control and Air Traffic Control Communications Architecture



Initial Payload C2 and Status Communications Architecture

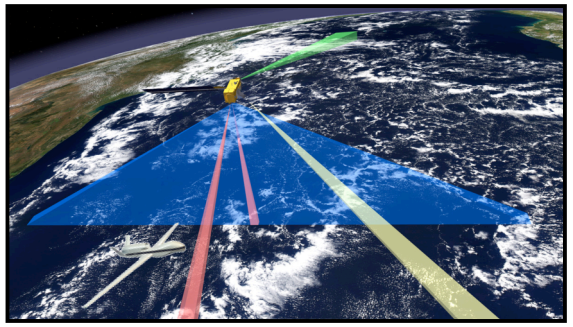


Payload Data & C2 Architecture

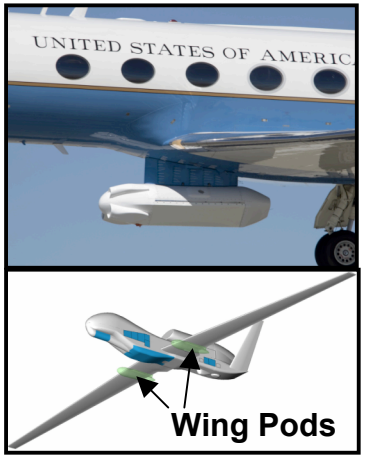


NASA Global Hawk Missions

- Unmanned Aerial System AURA Validation Experiment. (UAS AVE)
  - April-May 2009 is the target date.
  - Flights will cover the Pacific Ocean region south of Hawaii.
  - 10-15 NASA and NOAA sponsored instruments.
  - Data will be used for satellite validation.
  - Next planning meeting for UAS AVE is at Dryden in April.



- Unmanned Aerial System Synthetic Aperture Radar. (UAS SAR)
  - Flights to begin in mid to late 2009.
  - The SAR instrument, developed by JPL, is contained in a pod and is being flown on Dryden's G-III.
  - Northrop Grumman is conducting a feasibility study on adding wing pods to the NASA Global Hawk aircraft.



- Hurricane and Severe Storm Research.
  - Hurricane missions in 2010 and 2013.
  - Planning workshop at Dryden in June.

NASA/NGSC Global Hawk is on track to be operational in 2009